DOCUMENT RESUME

ED 285 390 FL 016 839

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TITLE Reconciling Uncertainty with Incredulity: A Unified Account of the L*+H L H% Intonational Contour.
PUB DATE Dec 86
NOTE 9p.; Paper presented at the Annual Meeting of the Linguistic Society of America (New York, NY, December 27-30, 1986).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Acoustic Phonetics; *Auditory Perception; English; *Interpersonal Communication; *Intonation; Models; Oral Language; Semantics; Sound Spectrographs; Stress (Phonology); Structural Analysis (Linguistics); Suprasegmentals
IDENTIFIERS *Pitch (Language); *Tone (Language)

ABSTRACT

Analysis of an intonational contour generally used to convey uncertainty about the appropriateness of some evoked scale or scalar value (as in "Anna may marry Manny") is extended to accommodate both uncertainty and incredulity interpretations. This paper proposes a more general account of L*+HLH%, based on an acoustic and pragmatic investigation of the contour. Previous interpretations for uncertainty are discussed. The additional incredulity interpretation is analyzed in comparison with and in conjunction with the uncertainty theory, and a new interpretation of the model that reconciles the two is proposed: that the contour can convey lack of speaker commitment to the appropriateness of an evoked scale or scalar value. Additional empirical research is planned. (MSE)

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Reconciling Uncertainty with Incredulity: A Unified Account of the L*+H L H% Intonational Contour

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1. Introduction

Previous analyses of the so-called **fall-rise** intonational contour have proposed different accounts of its contribution to utterance interpretation -- ranging from 'focus within a set' to 'incompleteness'. This contour has often been confused in the literature with other contours -- in particular, contradiction contour and A-rise (Ward & Hirschberg 1985). In fact, most previous studies have actually focussed on the contour identified in Pierrehumbert's system of intonational description as **L*+H L H%** (Pierrehumbert 1980). This contour, illustrated in Figure 1, would be appropriate in the context of 1

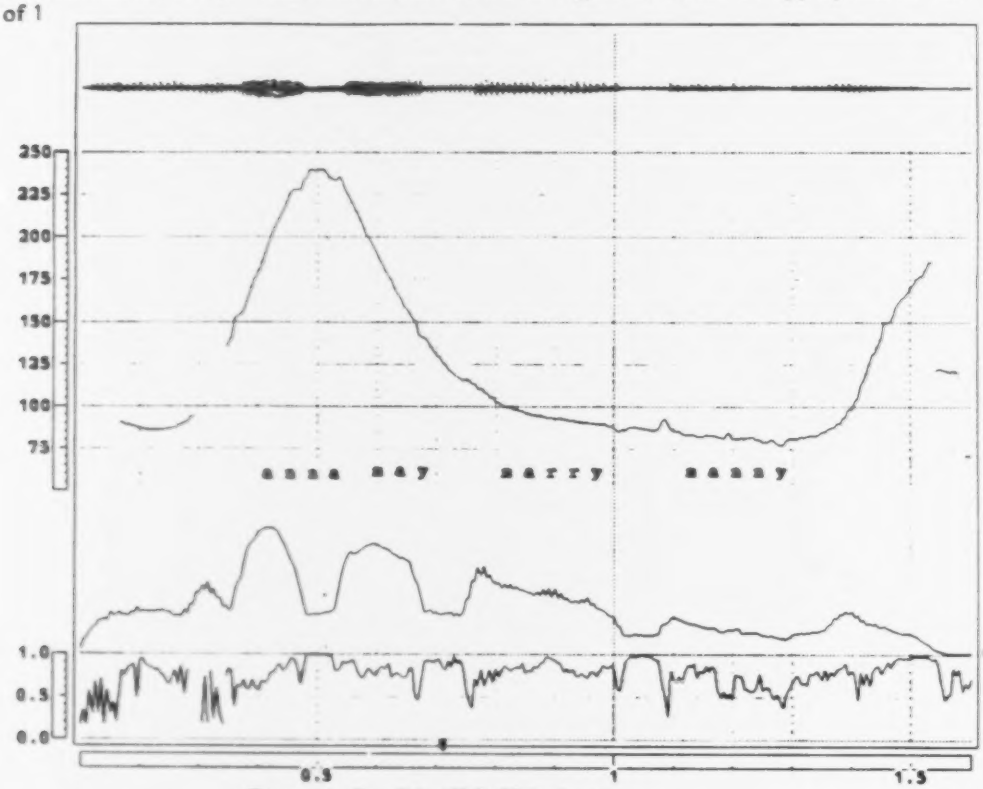

Figure 1. The L*+H L H% Contour

1.
A: Would anybody in their right mind marry Manny?

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B: Anna may marry Manny.
L*+H L H%

In Ward & Hirschberg 1985, we provided an account of the meaning of **L*+H L H%** subsuming previous proposals and accommodating an even broader range of uses. We claimed that the contour is used to convey 'uncertainty about the appropriateness of some evoked scale or scalar value'. Under this analysis, B's response in 1 might be interpreted as: "Well, Anna may marry Manny -- do you consider her to be sane?" However, Pierrehumbert (Pierrehumbert 1980, Pierrehumbert & Steele 1986) and Liberman (p.c.) have noted that **L*+H L H%** can also be used to convey 'incredulity' -- although clearly it does not do so in 1. In this paper, we propose a more general account of **L*+H L H%**, based upon an acoustic and pragmatic investigation of the contour, which subsumes both our earlier 'uncertainty' analysis and Pierrehumbert's and Liberman's observation. Extending our previous analysis, we propose that the function of **L*+H L H%** is to convey a speaker's *lack of commitment to the appropriateness of an evoked scale or scalar value*.

2. Previous Interpretations

The **L*+H L H%** contour -- known in the literature as *^{o}2-4-3* contour (Pike 1945); a subtype of Bolinger's **Accent A** (Bolinger 1958); tone *4* (Halliday 1967); Bolinger's **B accent** (Jackendoff 1972); as **fall rise** (O'Connor & Arnold 1961, Ladd 1980, Cutler 1977, Ward & Hirschberg 1985); as **contrastive stress within contradiction contour** (Liberman & Sag 1974); as **A-rise** contour (Bing 1979); and as **rise-fall-rise** (Pierrehumbert 1980) -- has inspired a variety of characterizations both of its form and of its meaning; these are described in more detail in Ward & Hirschberg 1985. We adopt Pierrehumbert's (1980) description of the phonological properties of the contour.

2.1 The L*+H L H% Contour

In Pierrehumbert's (Pierrehumbert 1980) theory of English intonation, intonational contours or **tunes** are described as sequences of **low** (**L**) and **high** (**H**) tones in the F0 contour. A well-formed tune for an intonational phrase consists of one or more **pitch accents**, which are aligned with stressed syllables on the basis of the metrical pattern of the text, plus single tones which characterize the **phrase accent** and the **boundary tone**. A pitch accent consists either of a single tone or an ordered pair of two tones, such as **L+H**. Accented syllables are marked by a star (*), as **L*+H**. Boundary tones are marked with %. Thus, **L*+H L H%** represents a contour with a complex pitch accent (**L*+H**), a low phrase accent, and a high boundary tone. In Figure 1, for example, the nuclear accent of the phrase is **L*+H**; the primary stressed syllable has a very low F0 (indicating an **L** tone), and the F0 peak (the **H** tone) occurs in the following syllable. The following phrase accent is low (another **L** tone) and the boundary tone is **H**, indicating sentence-final rise.

2.2 The Meanings of L*+H L H%

Previous authors have proposed that the **L*+H L H%** contour conveys 'a statement or answer with reservation ("there's a 'but' about it")' (Halliday 1967); 'incompletion' or 'up-in-the-airness' (Bolinger, personal communication); 'focus within a set' (Ladd 1980); reservation or implied contrast (Bing 1979); 'selection of a variable from the background' (Gussenhoven 1983); or contrast (Liberman & Sag 1974). In Ward & Hirschberg 1985, we noted some deficiencies in these accounts and proposed a new analysis based upon a large corpus of naturally occurring data.

In Ward & Hirschberg 1985, we found that **L*+H L H%** could be employed to convey speaker **uncertainty** about the appropriateness of some **scale** or **scalar value** evoked in the context. Scales are defined as **partially ordered sets**, or **posets**, which are defined by a **partial ordering R** on some set. R must be **reflexive**, **antisymmetric**, and **transitive**, or alternatively, **irreflexive**, **asymmetric**, and **transitive**.[1] This notion allows us to rank discourse referents as **values** on scales. The

relationships that provide the basis for the felicitous use of **L*+H L H%** are just those that can be represented as partial ordering relations. A value on a scale may be associated with an entity, attribute, event, activity, time, or place -- or with a set of such items. We can rank a property with respect to some entity which exhibits it via an *attribute-of* relation; an event, with other events, according to temporal precedence; elements or proper subsets of a set with respect to the set by an inclusion relation; and so on.

Given this definition of scales and scalar values, we claimed that a speaker may convey uncertainty about some scale or scalar value in three ways: First, a speaker may convey uncertainty about whether it is appropriate to evoke a scale at all in a given context. Second, a speaker may convey uncertainty about whether the scale evoked is an appropriate one in a given context. And, third, a speaker may convey uncertainty about whether the evoked scalar value is appropriate. Example 1 illustrates this type of uncertainty: Here, B conveys uncertainty about whether *Anna* would be included by A in the set of sane persons. We analyzed this contribution to utterance interpretation as a **pragmatic** one, a case of Gricean **conventional implicature**. We showed how other effects, such as irony or politeness, could be conveyed via this implicature.

2.3 The Incredulity Interpretation

However, the additional use of **L*+H L H%** noted by Liberman and Pierrehumbert does not seem to involve the conveyance of speaker uncertainty. Consider 2:[2]

2.

A. I'd like you here tomorrow morning at eleven.
B. !Eleven in the morning!
L*+H L*+H L H%

Here, **L*+H L H%** appears to convey incredulity on the part of the speaker about the proposed meeting time -- **not** uncertainty. This clearly presents a problem for our previous analysis.

Three possibilities suggest themselves. The first is that we are dealing with two phonologically distinct contours, i.e., the contour Pierrehumbert and Liberman have associated with the 'incredulity' reading is not the same contour that we have analyzed as conveying speaker uncertainty. If we are discussing the same contour, then there are two other possibilities: Either **L*+H L H%** represents a case of **intonational homophony**, i.e., one contour with two distinct interpretations; or, our earlier analysis of the meaning of this contour was overly restrictive in failing to capture this additional meaning -- and thus requires modification.

2.4 Reconciling Incredulity with Uncertainty

To test the first of these possibilities, we recorded tokens of **L*+H L H%** in contexts which favor, first, 'incredulity' and then, 'uncertainty'. For example, in 3, *eleven in the morning* receives the 'uncertainty' interpretation.

3.

A: Do you tend to come in pretty late then?

---

1. **R** is reflexive iff for all b1 ∈ **B**, b1 **R** b1. It is antisymmetric iff for all b1, b2 ∈ **B**, (b1 **R** b2 & b2 **R** b1) --> b1 = b2. It is transitive iff for all b1, b2, b3 ∈ **B**, (b1 **R** b2 & b2 **R** b3) --> b1 **R** b3. **R** is reflexive iff for all b1 ∈ **B**, b1 ¬R b1 and asymmetric iff for all b1, b2 ∈ **B**, b1 **R** b2 --> b2 ¬R b1. A relation satisfying the first definition of poset is *is-as-tall-or-taller-than*, and one satisfying the second is *is-taller-than*. Note that we can always start with a relation satisfying the second definition and produce one satisfying the first by adding an equality disjunct to the relation. For simplicity's sake, we use the second definition here.

2. We use !...! to indicate an incredulous interpretation of **L*+H L H%** here, and we will employ \../ to indicate the uncertainty interpretation below.

B: \Eleven in the morning. /
L*+H L*+H L H%

Recall that, in 2, the same string is interpreted as incredulous. The pitch track[3] corresponding to B's reply in 3 is presented in Figure 2, and that corresponding to B's reply in 2, in Figure 3:

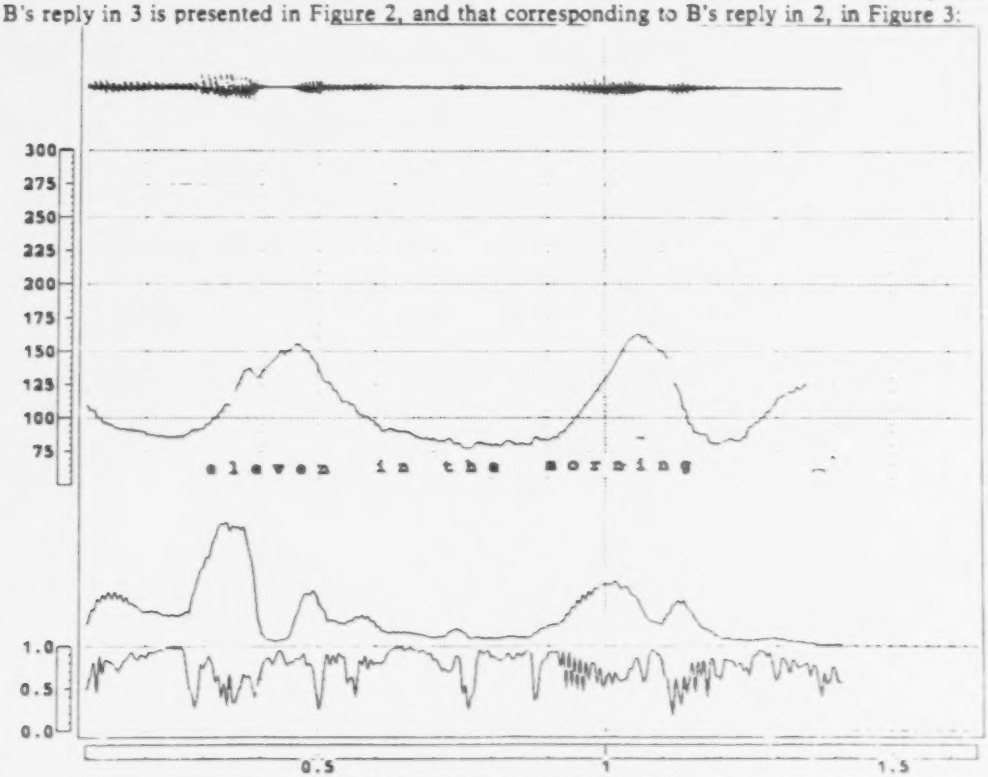

Figure 2. L*+H L H% Used to Convey Uncertainty

3. We used an autocorrelation pitch tracker written by Mark Liberman for this and other pitch tracks depicted in the paper.

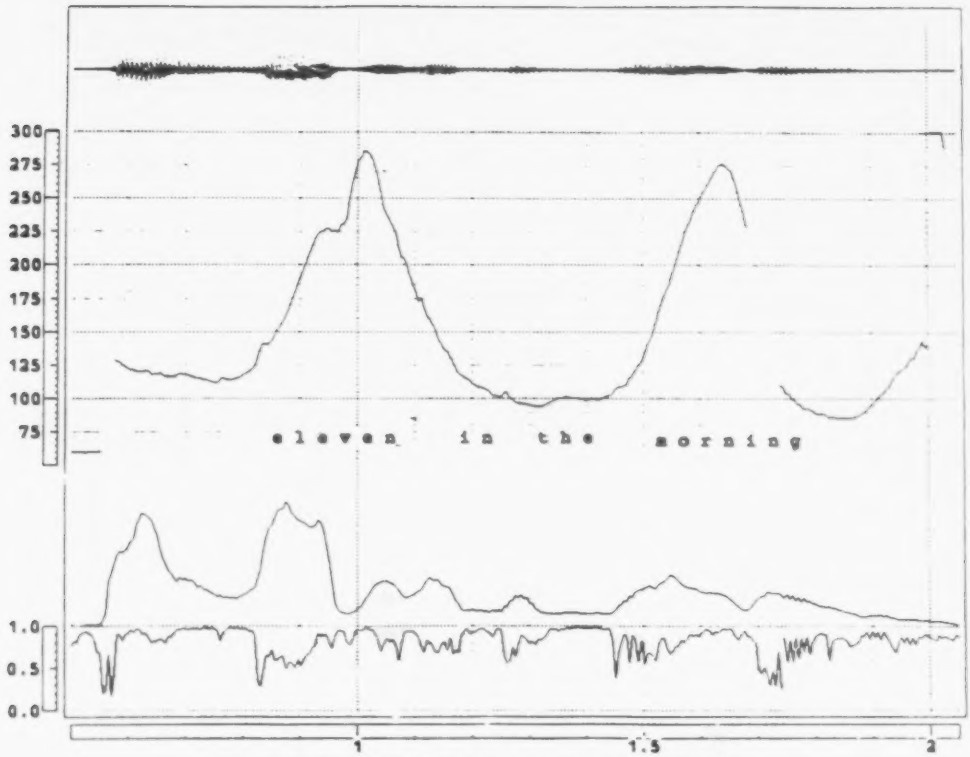

Figure 3. L*+H L H% Used to Convey Incredulity

In this comparison, as in other pairs we tested, both pitch tracks turn out to represent instances of the same tune -- **L*+H L H%**. Clearly there are consistent differences between these and other tokens in duration and pitch range -- here, the contour in Figure 2 reaches a peak value of 162 Hz, while that in Figure 3 reaches 285, and the first utterance is almost 700 msecs longer than the second. We also observed distinctions in voice quality. However, these features do not function as determinants of tune. So, the first possibility, that there are different tunes inducing incredulity and uncertainty, appears unfounded.

Given that we are dealing with a single contour, we must now determine how best to characterize its contribution to utterance interpretation. This presents a somewhat more difficult problem. That is, given two meanings associated with a single phenomenon, should that phenonemon be treated simply as ambiguous, or is there some abstraction from which both meanings can be derived? If this abstraction captures a significant generalization, then clearly it is to be preferred. We claim that there exists just such a generalization to be captured in the case of **L*+H L H%**.

We propose that a speaker's use of the **L*+H L H%** contour can convey *lack of speaker commitment to the appropriateness of a evoked scale or scalar value*. This analysis accommodates both the notion that L*+H L H% is used to convey *uncertainty*, i.e. 'It's *not* the case that the speaker believes a scale or scalar is appropriate', **and** the notion that it can convey *incredulity*, i.e. 'It *is* the case that the speaker believes a scale or scalar is *in*appropriate'. The subsumption of incredulity and uncertainty by the abstraction 'lack of speaker commitment' can be explained as follows: For any speaker **S** and any scale or scalar **x**, there are four possibilities:

4.

a. BEL(S, APPROPRIATE(x))
b. BEL(S, -APPROPRIATE(x))
c. -BEL(S, APPROPRIATE(x))

d. ~BEL(S, ~APPROPRIATE(x))

We can say that **S** is uncommitted to the appropriateness of **x** whenever **b v (c & d)** is true. Now, we can say that **S** is incredulous about the appropriateness of **x** just in case **b** is true. And, we can say that **S** is uncertain about the appropriateness of **x** whenever **(c & d)** are true. So, lack of speaker commitment **(b v (c & d))** subsumes both incredulity and uncertainty.

As noted above, in Ward & Hirschberg 1985 we describe three particular types of uncertainty that **L*+H L H%** can be used to convey, i.e., uncertainty about i) whether any scale at all is appropriate; ii) which of the possible scales is appropriate; and iii) which value on some particular scale is appropriate. Now we will show how this taxonomy can be extended to include cases in which **L*+H L H%** is used to convey incredulity.

An example of uncertainty involving incredulity about some value on a scale is illustrated above in 2, and repeated below for convenience:

A: I'd like you here tomorrow morning at eleven.
B: Eleven in the morning.
L*+H L*+H L H%

Here, the temporal scale is relevant, and B conveys, via **L*+H L H%**, belief that a value on that scale, i.e. *eleven in the morning*, is inappropriate. Type I incredulity is exemplified by 5:

5.
B: Did you take out the garbage?
A: Sort of.
B: !Sort of!
L*+H L H%

In this exchange, B conveys incredulity about the fact that A has evoked a scale -- where the scale evoked here is something like 'stages of a process of taking out the garbage'. For B, no scale is appropriate here. Note in fact that A may use an **L*+H L H%** contour also to convey uncertainty in this exchange, as in:

6.
B: Did you take out the garbage?
A: \Sort of/
L*+H L H%
B: !Sort of!
L*+H L H%

So, **L*+H L H%** can be used to convey incredulity about the uncertainty conveyed by a prior use of **L*+H L H%**. Finally, in 7, we illustrate Type II incredulity:

7.
A: I bet I know why Mary isn't dating John any more. He's ugly.
B: !He's ugly!
L*+H L H%

In 7, B conveys that a scale of attractiveness is inappropriate.[4] So, we see that there are three ways in which speakers can convey incredulity using **L*+H L H%**, corresponding to the three ways speakers can use the same contour to convey uncertainty.

4. Of course, B's remark might also be interpreted as conveying type III uncertainty: "!Ugly! I think John's quite handsome."

It is interesting to note that, when speakers employ **L*+H L H%** to convey uncertainty, it is usually directed at their own choice of some scale or scalar value. However, when **L*+H L H%** is used to convey incredulity, it is almost invariably directed toward another's choice of scale or scalar. This accords with another observation we have made about instances in which **L*+H L H%** conveys incredulity: Generally, in such cases, speakers express incredulity about a value already evoked in the discourse. For example, notice the infelicity of B1's incredulity in ZZ; while B2's uncertainty is fine.[5]

8.

A: Everybody had a good time.
B1: #!Some people had a good time!
L*+H L H%
B2: \Some people had a good time/
L*+H L H%
B3: !Everybody had a good time!
L*+H L H%

Of course, it is difficult to imagine why B1 would want to convey that *some* is inappropriate in this context, since its appropriateness is nowhere in question -- although the appropriateness of *everybody* could be (see B3). But B2 might plausibly wish to convey uncertainty about the appropriateness of a new value -- *some* -- which she herself has proposed. Despite the apparent restriction of an incredulous interpretation of **L*+H L H%** to items explicitly evoked in the discourse, items do not need to be mentioned to be evoked. Consider 9:

9.

A: I hear John and Mary are calling it quits.
B: !They're separating!
L*+H L H%

3. Discussion

In this paper, we have proposed an extension of our previous analysis of the contribution the **L*+H L H%** contour makes to utterance interpretation, which accommodates both an uncertainty and an incredulity interpretation of the contour. To confirm this new account and to further investigate the conditions under which one interpretation is favored over the other, we intend to conduct a series of empirical studies. Recalling the distinctions noted in our comparison of Figures 2 and 3, we will examine how variation in duration, pitch range, and voice quality affects subjects' interpretation of the contour.

The characterization of the sorts of contributions various intonational features make to utterance interpretation is a long-term goal of studies of intonational meaning. Here, we have shown how one intonational contour -- **L*+H L H%** -- conveys information about beliefs speakers hold regarding the appropriateness of certain items evoked in the discourse. What we know about other contours, such as contradiction contour, the surprise-redundancy contour, yes-no question contour, and declarative contour, suggests that these too may involve the communication of propositional attitudes toward discourse entities or propositions evoked in the discourse. For example, contradiction contour might be seen as conveying speaker belief in the falsity of some proposition **p** (BEL(S,¬p)), while a declarative contour might be seen as conveying (BEL(S,p)), and a yes-no question contour as conveying uncertainty about a proposition (¬BEL(S,p) & ¬BEL(S,¬p)). These characterizations obviously require considerable study. However, it seems reasonable to propose a taxonomy of the meaning of particular intonational contours in terms of the propositional attitudes which they convey.

5. We employ '#' to denote pragmatic infelicity.

REFERENCES

Bing, J. 1979. Aspects of English prosody. dissertation, University of Massachusetts at Amherst. Reprinted by the Indiana University Linguistics Club, 1980.

Bolinger, D. 1958. A theory of pitch accent in English. Word 14.109-149.

Cutler, A. 1977. The context-dependence of 'intonational meanings'. Papers from the Thirteenth Regional Meeting, Chicago: Chicago Linguistic Society.

Gussenhoven, C. 1983. On the grammar and semantics of sentence accents. Dordrecht, Neth.: Foris. Publications in Language Sciences, 16.

Halliday, M. A. K. 1967. Notes on transitivity and theme in English, part 2. Journal of Linguistics 3.199-244.

Jackendoff, R. S. 1972. Semantic interpretation in generative grammar. Cambridge MA: MIT Press.

Ladd, D. R. 1980. The structure of intonational meaning. Bloomington: Indiana University Press.

Liberman, M., and I. A. Sag. 1974. Prosodic form and discourse function. Papers from the Tenth Regional Meeting, Chicago: Chicago Linguistic Society.

O'Connor, J. D., and G. F. Arnold. 1961. Intonation of colloquial English. London: Longmans.

Pierrehumbert, Janet B. 1980. The phonology and phonetics of English intonation. dissertation, Massachusetts Institute of Technology.

———, and Shirley Steele. 1986. Tonal alignment and category in English intonation. Submitted to International Congress of Phonetic Sciences.

Pike, K. 1945. The intonation of American English. Ann Arbor MI: University of Michigan Press.

Ward, G., and J. Hirschberg. 1985. Implicating uncertainty: the pragmatics of fall-rise intonation. Language 61:4.747-776.